

REMARKS

The Office Action dated July 14, 2006, has been received and carefully noted. The above amendments and the following remarks are being submitted as a full and complete response thereto.

By this amendment, Claims 1, 2, 4, 7, 8, 16, 17, 19, 23, and 24 have been amended. Claims 10, 11, and 15 were canceled by a prior amendment. The Applicants submit that the claim amendments are fully supported in the specification and drawings as filed, and that no new matter has been added. Thus, Claims 1-9, 12-14, and 16-26 are currently pending in the application and are subject to examination.

Rejections Under 35 U.S.C. § 103(a)

Claims 1-5, 7, 8, 9, 12, and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tokuda et al. (U.S. Patent No. 5,134,965, hereinafter "Tokuda") in view of Otsubo et al. (U.S. Patent No. 4,985,109, hereinafter "Otsubo"), and Ohmi et al. (U.S. Patent No. 6,830,652, hereinafter "Ohmi") and Tadahiro et al. (U.S. Patent No. 6,830,652, hereinafter "Tadahiro").

Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Tokuda, Mitsuo et al. (U.S. Patent No. 5,134,965, hereinafter "Mitsuo"), Otsubo and Ohmi, and Tadahiro in view of Tsuchihashi et al. (U.S. Patent No. 6,109,208, hereinafter "Tsuchihashi").

Claim 14 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Tokuda, Mitsuo, Otsubo, and Ohmi, and Tadahiro in view of Tsuchihashi, and Masaaki et al. (U.S. Patent No. 6,109,208, hereinafter "Masaaki").

Claims 16-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tokuda, Mitsuo, and Otsubo, in view of Ohmi and Tadaihiro.

To the extent these rejections remain applicable to the claims currently pending, the Applicants traverse the rejections.

Claims 1 and 2 recite a plasma processing apparatus for processing an object using a plasma, comprising, among other features, a microwave radiating antenna having a microwave radiating surface and a dielectric body provided so as to be opposed to the microwave radiating surface, wherein **no additional microwave radiating antenna is placed between the microwave radiating antenna and the dielectric body**, and wherein a **distance D between the microwave radiating surface and a surface of the dielectric body facing away from the microwave radiating surface, which is represented with a wavelength of the microwave being a distance unit, is determined to be in a range satisfying an inequality**, and wherein **one end of the standing wave is positioned on the plasma exciting surface**.

Claims 7 and 8 recite a plasma processing method for processing an object using a plasma, the method comprising the steps of, among others, radiating a microwave for exciting a plasma from a microwave radiating antenna having a microwave radiating surface to the processing cavity, providing a dielectric body so as to be opposed to the microwave radiating surface, and determining **a distance D between the microwave radiating surface and a surface of the dielectric body facing away from the microwave radiating surface, which is represented with a wavelength of the microwave being a distance unit, to be in a range satisfying an inequality**, and

wherein no **additional microwave radiating antenna is located between the microwave radiating antenna and the dielectric body**, and wherein **one end of the standing wave is positioned on the plasma exciting surface**.

Claims 16 and 17 recite a plasma processing apparatus for processing an object using a plasma, comprising, among other features, a microwave radiating antenna having a microwave radiating surface, the microwave radiating antenna being a radial line slot antenna having a number of slots formed and distributed in the microwave radiating surface, a dielectric body provided so as to be opposed to the microwave radiating surface, wherein **no additional microwave radiating antenna is located between the microwave radiating antenna and the dielectric body**, and wherein **a distance D between the microwave radiating surface and a surface of the dielectric body facing away from the microwave radiating surface, which is represented with a wavelength of the microwave being a distance unit, is determined to be in a range satisfying an inequality**, and wherein **one end of the standing wave is positioned on the plasma exciting surface**.

Claims 23 and 24 recite a plasma processing method for processing an object using a plasma, the method comprising the steps of, among others, radiating a microwave for exciting a plasma from a microwave radiating antenna having a microwave radiating surface to the processing cavity, providing a dielectric body so as to be opposed to the microwave radiating surface, and determining **a distance D between the microwave radiating surface and a surface of the dielectric body facing away from the microwave radiating surface, which is represented with a wavelength of the**

microwave being a distance unit, to be in a range satisfying an inequality, and wherein no additional microwave radiating antenna is located between the microwave radiating antenna and the dielectric body, and wherein one end of the standing wave is positioned on the plasma exciting surface.

The Applicants submit that the applied prior art fails to teach or suggest all the elements of the presently claimed invention.

Tokuda teaches an arrangement with two slot antennas 32 and 34. One slot antenna 32 is in contact with the upper surface of a quartz plate 5, while the other slot antenna 34 is disposed above the slot antenna 32 with the distance t being provided therebetween. Tokuda further teaches that the distance t is set to be an integral multiple of half of the guide wavelength or a value near the integral multiple thereof.

However, Tokuda fails to mention a distance between the lower surface of the slot antenna 32 and the lower surface of the quartz plate 5. There is no mention of the thickness of quartz plate 5. Accordingly, Tokuda cannot teach at least the combination of elements wherein **no additional microwave radiating antenna is placed between the microwave radiating antenna and the dielectric body, a distance D between the microwave radiating surface and a surface of the dielectric body facing away from the microwave radiating surface, which is represented with a wavelength of the microwave being a distance unit, is determined to be in a range satisfying an inequality, and wherein one end of the standing wave is positioned on the plasma exciting surface**, as recited in Claims 1, 2, 7, 8, 16, 17, 23, and 24.

The Office Action cites Ohmi as allegedly teaching "In order to prevent the discharge, the thickness of the dielectric material shower plate 103 is determined so that the gap is located at a position of a node of the standing wave of the microwave electric field," (see Office Action, Page 4). However, the thickness of the shower plate 103 in Ohmi is determined only so that a node of the standing wave is positioned within the gap 104 between the lower surface of the dielectric material separation wall 102 and the shower plate 103, thereby preventing the discharge at the gap 104. There is no mention of the thickness of the dielectric material separation wall 102 of Ohmi, which allegedly corresponds to the dielectric body of the present invention.

Accordingly, Ohmi fails to contribute anything to Tokuda to teach or suggest at least the combination of elements wherein **no additional microwave radiating antenna is placed between the microwave radiating antenna and the dielectric body, a distance D between the microwave radiating surface and a surface of the dielectric body facing away from the microwave radiating surface, which is represented with a wavelength of the microwave being a distance unit, is determined to be in a range satisfying an inequality, and wherein one end of the standing wave is positioned on the plasma exciting surface, as recited in Claims 1, 2, 7, 8, 16, 17, 23, and 24.**

Otsubo is cited as allegedly teaching a concentric slot antenna in a microwave plasma reactor having a number of slots formed and distributed in the microwave radiating surface where a part of the number of slots can be closed.

Tsuchihashi is cited as allegedly teaching a similar microwave plasma generating device including plural slots in the peripheral direction of the shutter antenna.

Neither Otsubo or Tsuchihashi, nor Mitsuo, Masaaki, and Tadahiro, which are mentioned but not specifically cited, cure the deficiencies of Tokuda and Ohmi as outlined above with respect to Claims 1, 2, 7, 8, 16, 17, 23, and 24.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. M.P.E.P. § 2143.03. For at least the reasons provided above, Applicants submit that Tokuda, Ohmi, Otsubo, Tsuchihashi, Mitsuo, Masaaki, and Tadahiro, alone or in any combination thereof, fail to teach or suggest all the elements of Claims 1, 2, 7, 8, 16, 17, 23, and 24. Accordingly, Claims 1, 2, 7, 8, 16, 17, 23, and 24 are allowable over the cited prior art.

As Claims 1, 2, 7, 8, 16, 17, 23, and 24 are allowable, the Applicants submit that Claims 3-6, 9, 12-14, 18-22, and 25-26 are likewise allowable for at least the same reasons Claims 1, 2, 7, 8, 16, 17, 23, and 24 are allowable, as well as for the additional subject matter recited therein.

Further, under U.S. patent practice, the U.S. Patent and Trademark Office has the burden under 35 U.S.C. §103 to establish a *prima facie* case of obviousness. In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Both the case law of the Federal Circuit and the U.S. Patent and Trademark Office itself have made clear that where a modification must be made to the prior art to reject or invalidate a claim under 35 U.S.C. §103, there must be a showing of proper motivation to do so. The mere fact that a prior art reference could arguably be modified to meet the claim is insufficient to establish obviousness. The

U.S. Patent and Trademark Office can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. Id. In order to establish obviousness, there must be a suggestion or motivation in the reference to do so. See also In re Gordon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984) (prior art could not be turned upside down without motivation to do so); In re Rouffet, 149 F.3d 1350 (Fed. Cir. 1998); In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Lee, 277 F.3d 1338 (Fed. Cir. 2002).

The Office Action restates the advantages of the present invention to justify the combination of references. There is, however, nothing in the applied references to evidence the desirability of these advantages in the disclosed structure.

Thus, the Applicant submits that a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request withdrawal of the rejections.

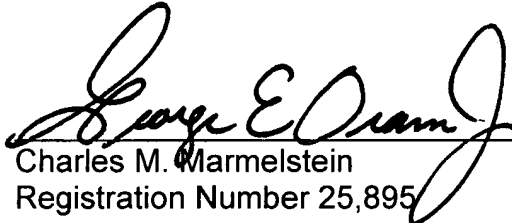
Conclusion

In view of the foregoing, reconsideration of the application, withdrawal of the outstanding objections and rejections, allowance of Claims 1-9, 12-14, and 16-26, and the prompt issuance of a Notice of Allowability are respectfully solicited.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event that this paper is not being timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to Counsel's Deposit Account Number 01-2300, referencing Docket Number 107176-00007.

Respectfully submitted,


Charles M. Marmelstein
Registration Number 25,895
27931

Customer Number 004372
ARENT FOX PLLC
1050 Connecticut Avenue, NW
Suite 400
Washington, DC 20036-5339
Telephone: 202-857-6000
Fax: 202-638-4810

CMM/SCO:vmh